

***IN VIVO* FLUORESCENCE SENSORS, SYSTEMS, AND RELATED  
METHODS OPERATING IN CONJUNCTION WITH  
FLUORESCENT ANALYTES**

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Abstract of the Disclosure

Methods, systems, devices and computer program product include: (i) administering a fluorescent analyte to a subject; (ii) repetitively emitting excitation light from an implanted sensor over a desired monitoring period; (iii) detecting  
10 fluorescence intensity in response to the excitation light using the implanted sensor that outputs the excitation light; and (iv) using data associated with the detected fluorescence intensity to perform at least one of: (a) calculate the concentration or dose of the analyte received proximate to the implanted sensor site; (b) evaluate the pharmacodynamic or pharmacokinetic activity of the fluorescent analyte; (c) confirm  
15 Ab attachment to a tumor site; (d) monitor a non-target site to confirm it is not unduly affected by a therapy; (e) monitor for changes in cellular properties; (f) use the calculated dose or concentration data to adjust or customize a therapeutic amount of the analyte administered to the subject; (g) confirm micelle concentration at a target site and then stimulate toxin release based on the confirmation; and (h) monitor for  
20 the expression of a protein produced from a gene therapy modification.

In particular embodiments, the intensity of the excitation signals emitted to the localized tissue can be varied in a predetermined manner to generate optical profiling data of the response of the tissue proximate the sensor.